1934

The Relation Between Entrance Age and Subsequent Progress in the Primary Grades

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THE RELATION BETWEEN ENTRANCE AGE AND SUBSEQUENT PROGRESS IN THE PRIMARY GRADES

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A Thesis Submitted in Partial Fulfilment
of the Requirements for the Degree of
Master of Arts
in
Loyola University
1934

CONTENTS

TABLES

FIGURES

CHAPTER I

PURPOSE AND PLAN OF THE STUDY

The writer's interest in the problem treated in the present study is due to the fact that, as principal of an elementary school with an enrollment of about six hundred pupils, she is frequently obliged to deal with parents who desire to enter children before the legal age of six years. Since the Catholic elementary schools of Chicago promote only annually, a child who is refused admission to first grade because he lacks several months of being six years of age will be kept out of school until he is almost seven. Undoubtedly, it is preferable for him to be thus kept out of school than for him to enter at an age which foredooms him to failure. On the other hand, if the child is capable of succeeding, his chronological age ought not to subject him to the handicaps of grade placement which offer little or no challenge to his mentality, and which may deprive him of a year of work on a higher level should economic pressure force him from school, nor should it impose upon his parents the burden and inconvenience of his spending additional time in the Kindergarten, or of themselves training and developing the mind sufficiently mature to undertake work on a first grade level. In short, the principal ought to be

able to say more than that "the law requires that he should have reached his sixth birthday." Supporting the law or the regulations should be the fact that earlier entrance is undesirable from the standpoint of the child.

The problems attacked in the present thesis are, therefore, the following:

1. Taking the chronological age of six as a basis, to what extent do the child's chances of success increase or decrease in proportion to the extent to which he exceeds or falls short of that age? Is there any critical point below which it is certainly unwise to admit the child?

2. What added knowledge concerning the child's readiness to enter school is derived from data concerning his mental age?

In view of the fact that children with a chronological age of six will have mental ages ranging, roughly speaking, from four or less to ten or more, the utility of making any study of the relationship between chronological age at entrance and success may be challenged. The answer to this objection is that the principal in very many schools is forced to admit on the basis of chronological age alone. The alternative is to administer mental tests. But tests are expensive, and schools not abundantly financed are economically obliged to consider the testing program

impractical. Moreover, individual tests require much time, particularly for children not sufficiently adjusted to their environment, yet group tests, though valuable, do not give the information gleaned by the expert clinician in his individual examination.

As a matter of fact, no schools in America administer intelligence tests to all children for the purpose of determining readiness to enter first grade. The nearest approach to such a system is found in certain large cities which maintain kindergartens or preprimary classes and which are thus able to obtain evidence of readiness for first grade before promoting. For such schools the findings of this thesis, at least as regards chronological age, may be of little value. There remain, however, many schools which do not, can not, and for some time at least will not depend on anything other than chronological age as an index of first grade readiness. For these schools there is a value in knowing precisely what reliance can be placed upon chronological age.

The existence of two assumptions must be frankly recognized.

First, there are very many factors other than either chronological or mental age which affect school success. It is assumed that, when fairly large groups of children are

concerned, these factors are operative according to the usual law of normal distribution. Our findings, then, will not be rigidly applicable to any one child, who may succeed or fail despite the evidence afforded by chronological age or mental age; but they will be applicable to large groups, and will enable the principal to tell parents that the child's chances of succeeding are, for example, so many in a hundred.

Secondly, it is assumed that teachers' marks are a reliable index of success. Much has been written concerning the unreliability of teachers' marks (27:263)(30:14,24,26)(28:16-18)(6:4), and few teachers consider that achievement is the sole basis for marks (38:420-427). It is also a well known fact that schools vary to a great extent in their standards (20)(4:6), with the result that the quality of work which is looked upon as acceptable in one school would be considered failure in another. In accepting promotion as evidence of ability to do first-grade work, therefore, we do not affirm that the work done was actually up to the standard that ought to prevail in a well-administered school. We merely affirm that, in the schools represented in this study, and for any others similarly administered, such work is actually looked upon as satisfactory, and that in consequence we know from our

data how old a child must be to be able to accomplish it. It would be unreasonable for a principal to declare that a child is too young to succeed if as a matter of fact the standards of the school are such that very young children can and do succeed. A passing mark in first grade may not indicate that a child has done work worthy of a first-grader in a school with reasonably good standards, but it does indicate that he has given satisfaction in the school where he is.

CHAPTER II

CHRONOLOGICAL AGE AND READINESS FOR FIRST GRADE

In the United States most states require that children should begin to attend school at the age of six. In the examination of 59 school surveys, all but five considered six years the normal age of entering school (7). Legislation concerning the age at which children may enter school if they have not reached the age of six is less common. In Massachusetts (10) the median age for admission to first grade is 5 years 6 months; in some cities and towns children are admitted at the age of 4 years 8 months.

At this point we may ask ourselves: What is the six-year-old who enters first grade expected to master in the course of his first year in school?

The writer is not familiar with any studies that attempt to give a complete answer to this question, but an approximately correct answer can at least be attempted by examining into the work commonly undertaken at this level.

In reading we find, if we accept the Elson series of readers as representing a general trend, that the child is expected to be able by the end of the year to recognize approximately 500 words. In the First Grade Manual, Hardy (16), gives 597 different words.

In Spelling the Chicago Course of Study sets down 78 words.

In number work the Course of Study specifies the reading and writing of numbers from 1 to 10, finding dates on the calendar, and finding the number of pages in a book.

Now, as a matter of fact, children in first grade are found as a general thing to be strikingly unsuccessful in mastering this comparatively small amount of material to the satisfaction of their teachers. We may divide the studies on this question into two divisions: first, those that present data on first-grade failures without stating the ages of the failing pupils, and those that present data classified by age groups.

A number of studies give data on first-grade failures without classifying these failures by age groups. An early study involving both rate of progress and quality of work was made in England by W.H. Winch (39) but since the entrance age is earlier there, between three and five years, than in this country, little scientific knowledge can be gleaned from this thorough investigation. It is of interest, however, to note two of the author's conclusions, namely, that "early entrance to school confers no intellectual advantage on the child, either in his early school work or in his subsequent progress in later school life," and that "there is reason to suppose that children who enter after five years of age

show some retardation in subsequent school progress."

Dr. Leonard P. Ayres (1) gives the results of studies made under his direction. In the first study, he determined the number of years necessary to complete the eight elementary grades for 257 children in the schools of Manhattan, the children varying in age from five to nine years at their entrance to the first grade. The results indicate that those below 6 years required three months longer than the 6 year entrants, and for the other ages, the time required to complete the eight grades, decreased in about the same proportion, with each increase of age.

The second study included the records of 11,185 children. The investigation covered their complete school records from entrance into the first grade through completion of the eighth. Children who began at six gained in the entire course of eight years, but one month on those who began at five. Those who began at seven gained but one month over those beginning at six. In the case of those starting between the ages of eight and twelve, the gains were much greater. Nevertheless, this study shows clearly, as does the first study, that with respect to progress there is little difference between those entering at five and those entering later.

That chronological age fails to predict reading ability with any degree of precision is reported by Theisen (33) as follows:

> Chronological age at any stage of school life if less indicative of probable success than mental age or mental maturity. It is not surprising that our results showed no correlation between score on the Haggerty test and chronological age. For 210 first grade pupils and 190 second grade pupils selected at random, the correlations between age and scores were zero except one correlation of 0.13 between Test I and age in the second grade, and these figures are too small to be of significance.... If chronological age were one of the strong factors in providing results in primary reading we should expect to find a decided positive correlation between it and reading performance. Such a condition would mean in general that the older the child in a given grade, the better his reading.

The effect of chronological age on reading achievement in the data of Brooks' study (3:826) using the partial correlation technique and eliminating or rendering constant certain measured factors was found to be as follows:

> If mental age is partialed out or held constant, reading ability and chronological age have a relationship average - 0.13. If chronological age is held constant, reading achievement and mental age have a positive relationship averaging .595. If then we consider pupils in school studying reading, our data lend support to the view that chronological age within a grade is in itself of little significance for reading achievement, but that mental age is of considerable importance.

Odell (21) found that grade I was accountable for 28 per cent of the non-promotions found in 96 city school systems in Illinois, and that grades II and III are each

responsible for about 15 per cent.

After a careful study of four years to learn the causes of the large percentage of non-promotions in first grade, Hall and Crosby (15) concluded that immaturity was the main factor.

In an investigation by questionnaire, conducted by Reed (26) relative to the factors used for admission of children to the first grade, the number of times the administrators of public schools throughout the country checked chronological age as a factor for admission of kindergarten children to first grade far exceed the number of times they checked any other factor. Forty-one superintendents checked chronological age forty-one times, or 100 per cent; seventy-seven supervisors checked it sixty-four times, or 83.1 per cent; nineteen principals checked it seventeen times, or 89.4 per cent. For admission of non-kindergarten children to first grade, chronological age was given a median weighting of 100 per cent by 137 administrators of public schools.

In 1929, the records of 114 boys and girls who were that year graduated from Waco High School were studied. Their ages at the time they entered first grade were as follows: 6 entered at the age of 5 years, 62 at the age of 6, 41 at 7, and 5 at the age of 8. None had attended

kindergarten. The pupils who entered at 6 years and those who entered at 7 years were compared with reference to four criteria: (1) the total time spent in the public school; (2) grades made in the high school; (3) the number of half-units failed in the high school; (4) ages at graduation. The comparison of the groups with reference to the time required to complete the eleven grades of the public school shows that the six-year-old entrants completed the eleven grades in about one-fourth of a year less than was required by the seven-year-old entrants. The data regarding scholastic success as measured by the marks of the high school teachers are difficult to evaluate. The percentage of each group receiving marks of A,B, and C on the courses completed are shown in Table I. Table II indicates the number of half-units failed in the high school. The children who entered first grade at the age of six seem on the whole to be more successful, though in the case of the girls, there is evident a slight advantage in favor of those who entered at seven. A fourth measure of relative success is found in the ages at graduation. These data are presented in Table III. In summarizing the progress made by the six-year-old and seven-year-old entrants to the first grade, it was found that those who entered at six took about a quarter of a year less to complete the eleven grades

TABLE I

Comparison of Children who Entered at 6 years and at 7 years with Reference to Marks Received in High School

Percentage	6-year-old Entrants	7-year-old Entrants
Receiving A	11.3	14.6
Receiving B	75.8	56.1
Receiving C	12.9	29.3

TABLE II

Age at Entrance of 200 Pupils to Elementary School and Number of Half-Units Failed by Same Pupils in High School

Sex	Age at Entrance	Number of Pupils	Half-Units Failed	Mean	Difference of Means
Boys	6	13	37	1.94	
"	7	16	71	4.44	2.5
Girls	6	43	32	.74	
"	7	25	15	.60	.144
Both	6	62	69	1.113	
"	7	41	86	2.09	.977

TABLE III

Entrance Ages of Six and Seven Years Compared with Reference to Ages at Graduation

Sex	Age at Entrance	Number of Pupils	Mean Age at Graduation	Difference	Difference at Entrance
Boys	6	19	17.25		
"	7	16	17.97	.72	.73
Girls	6	43	17.25		
"	7	25	18.35	1.10	.71

of the schools, made marks slightly higher in the courses completed in the high school, failed about one course less per pupil, and were a little less than a year younger at graduation.

An investigation of the rural schools of Delaware shows that 50 per cent of the children who entered in 1915 failed (8). Roe (27:263) secured data on non-promotions in the first grade from 9 schools of New York and New Jersey. The average percentage of failure in IB for the nine schools was 20 per cent; for IA, 13 per cent.

In a study of the San Francisco public schools (11) during the year 1931-32, from a total of 3410 children of IB grade, 354 were not promoted, or a total of 10.38 per cent. In the following year from a total of 3191 children, 315 were not promoted, or a total of 9.9 per cent.

According to statistics assembled by Chicago school authorities (32), 17.48 per cent of the IB grade which entered in the fall of 1930 were not promoted, and 19.77 per cent of the IB grade entering in the spring of 1931 were not promoted. This is a slightly lower percentage of non-promotion in IB than is found in the average community which is 20.1 per cent (20).

The Ninth Yearbook of the National Department of Superintendence (12:52) reports that replies to questions

were received from 493 superintendents of schools to the effect that in cities of all sizes, the first grade is the one in which the largest number of children fail.

The writer was not able to locate any large number of studies in which first-grade failures are classified by age groups.

Busby (4:12) in a study of schools in Virginia, reports that 54 out of a total of 259 first-grade children failed, or a total of 20 per cent. 91 per cent of these children were 6 years old chronologically at the beginning of the term, yet only 79 per cent of these were promoted. The remaining percentage of failing children were older than 6 years. The average age at the beginning of the term for the pupils who failed was 6 years 9 months.

Cavins (5) reports that in a study made in West Virginia, out of a total of 79 first grade children, 9 failed, or a total of 11 per cent. Of these failures, 4 ranged in age at entrance from 5-3 to 5-9; 5 from 6-2 to 6-6.

Cooper (8) laments the severe handicap that pupils suffer who enter school under 6 years of age. Of 928 pupils, only 18 per cent finished the eighth grade without repeating one or more grades. 67 per cent remained in the first grade a second year, while 25 per cent were kept three consecutive

years. Children who entered at 7 years or more, made rapid progress in grades I, II, and III, but suffered losses later.

The trend of the evidence up to this point is that younger children fail more frequently in first grade than do older children. The explanation of this fact which first presents itself to one's mind is that, the lower the average chronological age, the lower will be the average mental age. The relationship between mental age and success in the primary grades will be discussed in Chapter III. For the present we may content ourselves with attempting an answer to this question: What factors other than mental age - factors which may operate more strongly in the case of younger children - have been found or thought to contribute to failure in the primary grades?

Otto (22) is of the opinion that a lack of proper motivation is a frequent cause of failure. This is very probably true. Motive conditions results. It is also probably true that deficiency in motivation is more commonly found as we descend in the age scale. Another reason that this author gives is the shifting of criterion for promotion. Chronological age is generally the deciding factor in admitting pupils to the first grade, but at the end of the first grade the important factor is reading ability. This difficulty might also be solved by proper

motivation, that is, by adjusting materials and methods to the needs of the child.

Defective sense organs and other physical defects are thought by Starch (31:513-536) to be a grave cause of interference with young children's progress.

The preponderance of opinions in reports and studies on the failures of first-grade children hold that immaturity for reading skills is the main cause of non-promotions.

After a four-year study of failures, Hall and Crosby (15) are of the opinion that children enter the first grade too young for instruction in reading.

Pugsley (25:18-20) states that children should be 7 or even 8 years of age before being subjected to the acute demands of the reading act. Because of their immaturity at entrance, one-third to one-sixth of the first-grade children, in general, fail. This large percentage of failures is verified by Mort and Featherstone (20), and McLaughlin (18:85-91).

Pennell and Cusack (23:157), Deputy (13), Morphett and Washburne (19), and Manuel and Voyer (17:521-528) agree in their opinion that reading is the chief cause of the large percentage of failure in the first grade. The reports from 344 superintendents of schools, representing cities of all sizes state that in the first grade where failure

ranks highest, reading is the subject of greatest difficulty (12:52).

There seems to be no data, based upon scientific research, to show that a child automatically becomes endued with ability to do the first grade work upon reaching any specific chronological age. Economic reasons and usage made this age the basis for classification, yet in the light of present scientific research, it is difficult to state any chronological age for entrance to first grade that is not modified in practice by other important factors.

Summary: The data in this chapter appear to justify the following conclusions: No specific chronological age can be stated which indicates a child's readiness to do first grade work. The abilities of children vary at any given chronological age. The optimum age of entrance seems to be from 6-0 to 6-6 years. A decrease in months from this age lessens proportionately the child's chances for success. If his entrance age is lower than five years, the possibility of his succeeding in the first grade is practically negligible.

CHAPTER III

MENTAL AGE AND SUCCESS

Since intelligence as measured by the Stanford-Binet and the group tests commonly employed in this country is that special type of intelligence which makes for success in school work (29:9)(34:431), it necessarily follows that, at any given level, children with higher mental ages have better prospects of success than less gifted children, provided that the advantage of superior learning ability is not counterbalanced by other factors. The correlation between mental age and achievement at all levels has been so frequently and so thoroughly studied that Buckingham several years ago expressed disapprobation of any dean who sanctioned another thesis on the same subject. To say that mental age correlates highly with achievement when health, occupation, home conditions, social activities, or attitude do not impose a barrier is merely to say that bright children are bright and that dull children are dull.

But it is one thing to declare that mental ability and achievement correlate highly, and quite another thing to establish that critical point below which success is impossible, improbable, or extremely difficult. The precise problem attacked in this thesis is not how closely mental

age correlates with progress in the primary grades, but rather to fix those mental-age levels which are requisite for any kind of satisfactory progress.

At the college level no studies bearing upon this problem, so far as is known to the writer, have been attempted. The reason probably is that few students ever reach the college level who could not, absolutely speaking, succeed.

At the high school level a number of interesting studies have been reported, among them those of Duff (14) of England and of Turney (35) in America.

Duff compared 73 students with I.Q.'s of 136 or more with 60 students of average intelligence or with I.Q.'s of approximately 100. Of the Intelligent group, 64 per cent went to the secondary schools. Of the Control group, 7 per cent, though not one passed the School Certificate; only one remaining long enough to attempt it. Ten of the Intelligent Group left school without taking the First School examinations. 81 per cent passed as opposed to 75 per cent for the entire number of candidates; the percentage of very good passes was two or three times the normal. The conclusion is that an I.Q. of 136 or higher is indicative of high school success, while an I.Q. of 100 indicates that a pupil can scarcely take up secondary school work, in

England, with hopes of a favorable outcome.

Proctor (24), in a six-year study, found a close correlation between Binet Intelligence Quotient and success in high school in the study of 131 pupils entering the high school. He found that 19 pupils or 100 per cent of those with an I.Q. of 125 or above, completed the high school course; of 27 pupils with I.Q.'s from 115 to 124, 96 per cent completed the high school and 4 per cent left school to go to work; 83 per cent of the 24 pupils with I.Q.'s from 105 to 114 finished high school, 17 per cent went to work; 75 per cent of the 36 pupils with I.Q.'s from 95 to 104, completed high school, 25 per cent went to work; 40 per cent of the 32 pupils with I.Q.'s from 85 to 94 completed the course and 60 per cent left school; of the three pupils with I.Q.'s from 75 to 84, 100 per cent left school. The conclusion one may draw from this study, as from a similar one made by Weisman (37) is that, with great industry and perseverance, a child with an I.Q. below 100 may succeed in the high school.

At the grade-school level a number of interesting studies have been reported, best known of which, perhaps, is that of Washburne (36) on the mental age required for success in arithmetic.

For five years the Committee of Seven of the

Northern Illinois Conference on Supervision studied this problem in 148 cities and with many thousands of children. Their technic in general was as follows: The grade in which a topic is usually taught was previously determined. Arrangements were made that the topic be taught in that grade, in the grade above and in the grade below. Previous to the teaching of a topic, teachers drilled on the necessary prerequisite processes, and gave a test to establish the fact that the pupils were ready. The scores of pupils found unready were not counted. Another test was given to ascertain whether pupils had learned elsewhere the process which they were about to be taught; if any had, their scores were not counted. The process was then taught for a period ranging from six to ten weeks according to detailed instructions issued by the Committee. At the end of the teaching period, a final test was given, and a test for retention after six weeks. If a pupil could pass the retention test with a score of 80 per cent, he was considered ready for a process. The optimal age for beginning a process was set where the curve flattens out to 16°. The results of this exact procedure in the primary arithmetic are as follows: The minimum mental age for addition facts 1-10 is 6 years 5 months with an optimum mental age of 7 years 4 months; for sums over 10, 7 years

4 months and optimum age of 7 years 11 months. To master the easier 50 subtraction facts, a minimum mental age of 6 years 7 months is required; the optimum age is 8 years 3 months. The harder 50 subtraction facts require a mental age of 7 years 8 months, the optimum age is 8 years 11 months. A minimum mental age of 8 years 9 months is necessary to grasp well the subtraction process including 100 addition facts and 100 subtraction facts. Short division would be postponed until a mental age of 11 years 4 months was attained; long division until 12 years 7 months. Although this study has been very sharply criticized from the statistical standpoint, it may at least be accepted as an example of a serious effort to determine critical points in mental ability.

Coming now to our own problem, we find a large number of excellent studies that bear directly upon the question before us.

In September, 1920, the pupils of the Detroit public schools, who were entering the first grade, were given the Detroit First Grade Intelligence Test. 3.7 per cent of the pupils were under 6 years of age; 72.5 per cent were 6 or 6½; 17.5 per cent were 7 or 7½; 6.3 per cent were over 8 years of age (2:185-230). Pupils with a mental age below 5 years 10 months were placed in a Z group; those with mental ages

ranging from 5 years 10 months to 7 years 2 months in a Y group; those with higher mental ages in an X group.

At the close of the semester, each teacher was asked to estimate the amount of work done by each pupil, taking as her standard the semester's work scheduled for the regular IB grade. From an examination of this report given in Table IV, and comparing the X and Z groups, we find that more than six times as large a per cent of Z pupils failed to complete a semester's work as of X pupils. On the other hand, 18.4 per cent of the X pupils completed more than a semester's work, while only 1.3 per cent of the Z pupils did so. In the X group, twice as many pupils did more than a semester's work as did less than a semester's work; in the Z group, forty-two times as many did less than a semester's work as did more than a semester's work. From Table V we see that more than four times as large a per cent of Y pupils failed of promotion as of X pupils, and more than eleven times as large a per cent of Z pupils failed as of X pupils.

In Table VI are presented the facts of attendance in relation to the amount of work done by each of the groups, X, Y, and Z. According to this table, intelligence is a factor of far greater importance in determining the amount of work done than a high per cent of attendance. Ten per

Number of Pupils	Per Cent of Total		Ranges of Scores	M.A.	Group
730	6.8	E	0-11	5 yrs. 9 mos.	
1187	10.3	D	12-19	and below	Z
1865	18.2	C-	20-28	5 yrs. 10 mos.	
2601	24.7	C	29-38	7 yrs. 2 mos.	Y
1802	17.6	C	39-44		
1450	14.2	B	45-50	7 yrs. 3 mos.	
876	8.2	A	51-70	and above	X
10511	100.0				

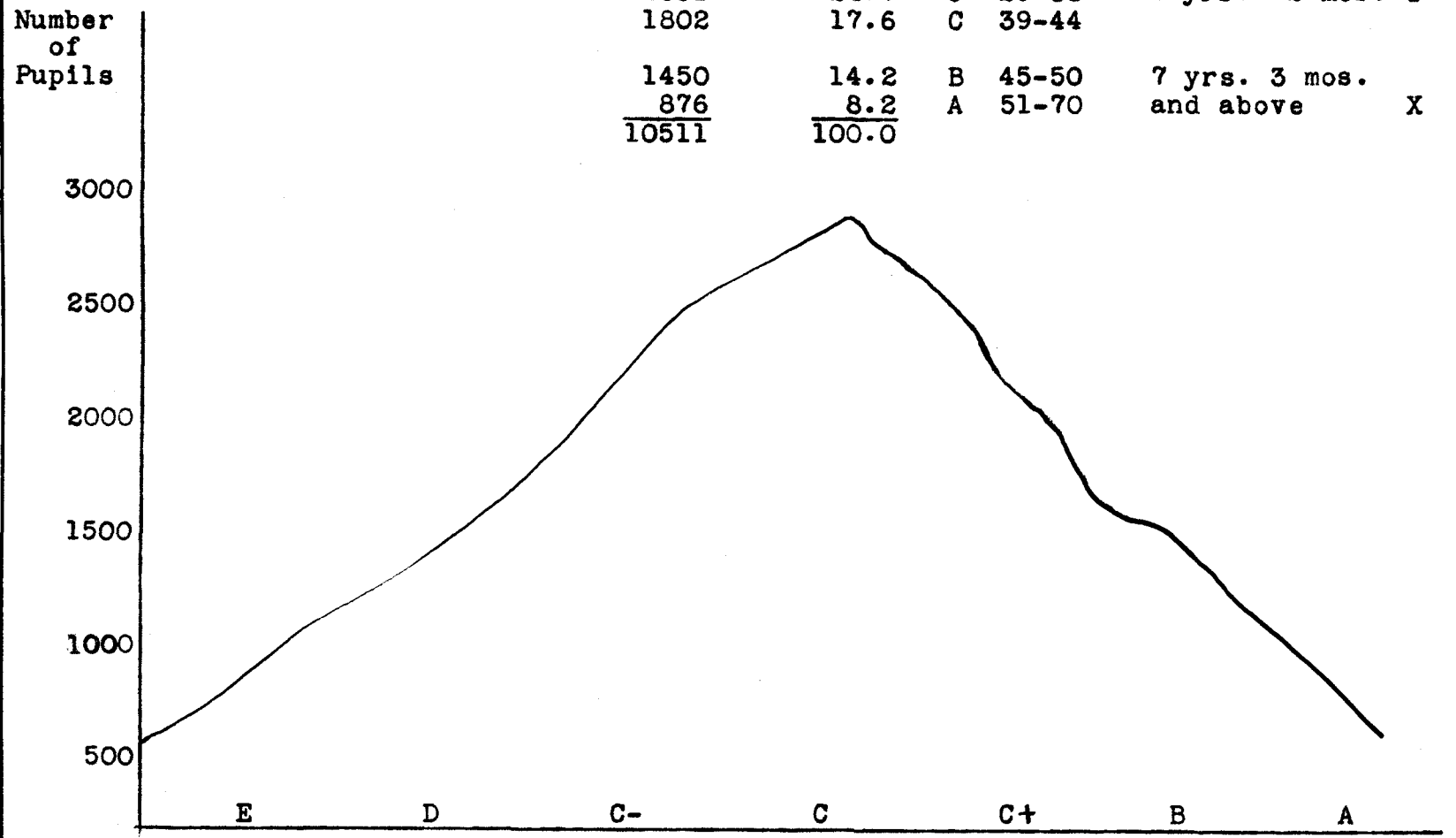

TABLE IV

Intelligence in Relation to Promotion

	Group X		Group Y		Group Z		Totals	
	No.	%	No.	%	No.	%	No.	%
Promoted	2201	96.7	5259	85.2	1168	62.6	8628	83.5
Not Promoted	74	3.3	914	14.8	700	37.4	1688	16.5
Totals	2275	100.0	6173	100.0	1868	100.0	10316	100.0

TABLE V

Intelligence in Relation to Amount of Work Done

Amount of Work Done	Group X		Group Y		Group Z		Totals	
	No.	%	No.	%	No.	%	No.	%
Semesters								
¼	40	1.8	429	7.4	327	20.2	796	8.3
½	58	2.7	499	8.6	300	18.5	857	8.9
¾	86	4.0	724	12.5	262	16.2	1072	10.1
1	1587	73.1	3932	67.5	710	43.8	6229	65.0
1½	199	9.2	126	2.2	7	0.4	332	3.4
2 or more	200	9.2	107	1.8	15	0.9	332	3.3
Totals	2170	100.0	5817	100.0	1621	100.0	9608	100.0

TABLE VI

Intelligence in Relation to Attendance and Amount of Work Done

Amount of Work Done / Attendance	Group X				Group Y				Group Z				Totals			
	No.	Less than a Sem. %	One Sem. %	More than a Sem. %	No.	Less than a Sem. %	One Sem. %	More than a Sem. %	No.	Less than a Sem. %	One Sem. %	More than a Sem. %	No.	Less than a Sem. %	One Sem. %	More than a Sem. %
150 or more half days 82% or more	1502	6.4	72.2	21.4	3793	22.6	72.1	5.3	1066	51.4	46.0	2.6	1361	23.6	67.7	8.7
100 to 149 half days	558	11.5	75.6	12.9	1466	34.0	62.2	3.8	471	11.2	37.6	1.2	2495	34.1	60.6	5.3
Less than 100 half days Less than 55%	175	20.6	66.3	13.1	510	41.2	55.1	3.7	129	69.0	31.0	--	814	41.2	53.7	5.1
Totals	2235	8.7	72.6	18.7	5769	27.1	68.1	4.8	1666	55.5	42.5	2.0	9670	27.8	64.7	7.5

cent more failures to complete a semester's work are found among the Z pupils who attended at least 82 per cent of the time than are found among the X, Y, and Z pupils combined who attended less than 55 per cent of the time. Among the X pupils who attended less than 55 per cent of the time is found a larger per cent of pupils completing more than a semester's work, and a smaller per cent completing less than a semester's work, than is found among the X, Y, and Z pupils combined who attended at least 82 per cent of the time.

According to this study, neither chronological age nor school attendance are the determining factors of progress in the first grade. It indicates that mental maturity was not the sole criterion of success among the X pupils. The fact that 62 per cent of the Z pupils were promoted indicates that a child with a low mental age, but industrious and persevering, may succeed as well as one with a high mental age who does not possess good work habits and attitude. The study shows conclusively that for this group the greatest single factor in first grade achievement is mental ability, and that the optimum mental age is six years or above.

In the study conducted by Cunningham (9), in the Newton School, Toledo, Ohio, two groups of children were tested for two successive years. The first group, 43 children, entered the first grade in September, 1921, and that same month were given the Pintner-Cunningham Primary Mental Test. In November, 1922, the Haggerty Sigma I Reading Test and the Pressey Attainment Test were given to the same children, who were at that time in three grades; the six leaders of the group, whose mental ages ranged from 8 years 3 months to 9 years 2 months, having completed the first and second grade courses in one year, were in the third grade; twenty-eight with mental ages ranging from 6 years 5 months to 8 years 1 month, were in the second grade; 9, with mental ages from 4 years 8 months to 5 years 6 months were repeating the first grade. Table VII shows the scores on the achievement tests given in November, 1922, compared with the scores from the Pintner-Cunningham test given in September, 1921. The scores from the Haggerty Sigma I Reading Test and the Pressey Attainment Test were converted into ranks of 1, 2, and 3, signifying good, average, and poor respectively. The scores of the Pintner-Cunningham Primary Mental Test were transmuted into mental ages. The table reveals that factors other than mental maturity are very important in determining first-

grade success. For instance, No39, with an M.A. of 5-3, ranks as high as each of the following: No.5, with an M.A. of 8-7; No.10, with an M.A. of 7-7; and No.21, with an M.A. of 6-3. The intervals of range between ranks 1, 2, and 3 are not designated.

In October, 1922, 54 children of the same school, who had entered first grade the previous month, were tested by means of the Pintner-Cunningham Primary Mental Test. In March, 1923, the same children were tested by means of the Pressey First Grade Attainment Test, and two series of number and reading tests devised for use in this study. Table VIII shows the scores on each of the achievement tests, converted into rank positions of 1,2,3, and 4, indicating the four quartile divisions, as compared with the mental test scores, and the class divided into four quarters. As an evidence of the amount of agreement between the mental test scores and the scores on the achievement tests, the correlation coefficient, after an interval of five months, was found to be .63. In order to examine the significance of the coefficients of agreement between mental test rating and achievement scores, the class was divided into three sections and each section subdivided into quartiles. A study of Table IX shows that the median, upper quartile, and lower quartile scores of the best group are consistently

TABLE VII

Scores on Achievement Tests Given in November, 1922, Compared with Scores of Pintner-Cunningham Mental Test, Given in September, 1921.

Achievement Scores Converted into Ranks of 1,2,3
Rank 1 - Good; Rank 2 - Average; Rank 3 - Poor

Pupil	M.A.	Spelling	Numbers	Reading
1	9.2	1	1	1
2	9	2	1	2
3	8.10	1	1	1
4	8.7	2	2	3
5	8.7	2	2	2
6	8.3	1	1	2
7	8.1	1	1	1
8	7.11	1	1	1
9	7.10	3	3	2
10	7.7	2	2	2
11	7.7	2	2	3
12	7.6	2	3	2
13	7.6	1	1	1
14	7.5	2	1	2
15	7.3	2	2	2
16	7.1	3	3	2
17	7.1	2	2	2
18	6.9	2	3	2
19	6.6	1	1	2
20	6.6	2	2	2
21	6.3	2	2	2
22	6.1	3	2	2
23	6.1	2	1	2
24	6.1	2	1	1
25	6.0	2	3	2
26	5.10	3	3	3
27	5.9	1	2	2
28	5.8	3	1	1
29	5.8	3	2	2
30	5.8	2	2	1
31	5.7	2	2	2
32	5.7	3	2	3
33	5.7	1	2	2
34	5.6	1	2	2
35	5.5	2	2	2
36	5.4	2	2	2
37	5.3	3	3	2
38	5.3	3	2	3
39	5.3	2	2	2
40	5.1	3	3	3
41	5.0	2	3	3
42	4.11	2	3	3
43	4.8	2	2	3

TABLE VIII

Scores on Achievement Tests given in March, 1923, Compared with Pintner-Cunningham Test given in October, 1922

Scores Converted into Ranks of 1,2,3,4
1 - Good; 2 - High Average; 3 - Low Average; 4 - Poor

Pupil	Reading Recog.	Picture Reading	Pressey Reading	Picture Number	Number Abst.	Pintner-Cunningham M.A.
1	1	1	1	1	1	8.8
2	2	2	1	2	1	8.5
3	2	2	1	2	2	8.3
4	1	2	2	1	2	8.3
5	1	1	2	1	1	8.0
6	1	1	1	1	1	7.11
7	2	3	1	2	2	7.10
8	1	2	2	3	1	7.9
9	1	1	1	1	1	7.5
10	1	1	1	1	1	7.5
11	3	1	2	1	1	7.5
12	3	2	4	2	1	7.4
13	2	1	2	3	2	7.4
14	1	1	1	1	1	7.4
15	1	2	2	1	2	7.3
16	4	4	4	4	3	7.3
17	3	2	2	2	4	7.2
18	3	3	3	3	3	7.2
19	2	1	1	2	1	7.1
20	1	1	3	4	2	7.1
21	2	3	2	1	2	7.1
22	2	3	3	3	2	7.0
23	3	2	2	1	1	6.11
24	3	2	4	2	2	6.11
25	4	3	3	4	3	6.11
26	2	2	2	3	2	6.9
27	3	3	3	1	2	6.9
28	3	2	2	1	3	6.7
29	3	3	3	3	3	6.7
30	2	2	3	4	3	6.7
31	1	1	1	2	2	6.5
32	1	2	1	3	2	6.4
33	2	2	1	3	2	6.3
34	3	3	3	4	4	6.2
35	4	4	4	4	4	6.2

TABLE VIII - Continued

Pupil	Reading Recog.	Picture Reading	Pressey Reading	Picture Number	Number Abst.	Pintner-Cunningham M.A.
36	3	3	4	2	4	6.1
37	2	4	3	3	3	6.1
38	2	1	3	3	3	6.0
39	2	3	3	1	2	6.0
40	4	4	4	4	4	5.9
41	1	2	2	2	3	5.8
42	2	3	2	2	3	5.5
43	3	3	3	3	2	5.5
44	3	3	3	4	3	5.3
45	4	4	4	3	4	5.1
46	4	4	4	4	4	5.1
47	4	4	4	3	4	5.0
48	4	4	4	4	4	5.0
49	3	4	4	4	4	4.11
50	4	4	4	4	4	4.7
51	4	4	3	4	4	4.5
52	3	4	2	3	3	4.3
53	4	4	4	4	4	4.0
54	3	3	4	4	3	4.0

TABLE IX

Comparison of Mid-Scores and Quartile-Scores upon a Basis of 1922 P.-C. Test — 54 Cases

	Scores in Total Achievement			Reading			Numbers			1922 P.-C.		
	Q_1	M	Q_3	Q_1	M	Q_3	Q_1	M	Q_3	Q_1	M	Q_3
Upper Fourth	133	120.5	118	92	85	81	41	38.5	33	8.3	7.9	7.5
Middle Half	114	94	80	80	66	54	34	27	23	7.0	6.7	6.2
Lower Fourth	79	53	35.5	58	33	19	21	18	13.5	5.2	5.0	4.2

TABLE X

Distribution of Mental Ages

Range in Mental Age	Central Grammar	Devon	Walnut Beach
3.0 - 3.5		3	1
3.6 - 3.11	6		1
4.0 - 4.5	2	2	1
4.6 - 4.11	7	5	5
5.0 - 5.5	14	10	2
5.6 - 5.11	10	18	10
6.0 - 6.5	12	6	7
6.6 - 6.11	9	9	7
7.0 - 7.5	8	10	2
7.6 - 7.11	3	3	5
8.0 - 8.5	1	1	3
8.6 - 8.11			
Total	72	67	44

higher in all tests than the corresponding scores of the middle group. The scores of the middle group are higher than those of the lowest group. Further examination shows that the mental test not only differentiates corresponding ratings in three groups, but with two exceptions, a differentiation into nine groups is seen. The two exceptions are: between the upper limits of the lowest fourth in reading and the lower limits of the middle half, and between the Q_3 ratings of the upper fourth in numbers and the Q_1 rating of the middle half.

This testing program seems to warrant the use of a group mental test as a means of classifying children at the time of school entrance. The results obtained from the achievement tests when compared with the mental ages of the children, seem to indicate that those entering school with a mental age below 5 years 6 months are incapable of doing the work of the first grade.

The Pintner-Cunningham Primary Mental Test was given in 1927 to 183 children who were entering the first grade in three public schools of Connecticut. The raw scores were transmuted into mental ages. These are shown in Table X. We see from this table that in the Central Grammar School the range of mental ages is from 3 years

6 months to 8 years 5 months, with a median mental age of 5 years 6 months. In the Devon School the range is 5 years with a median mental age of 5 years 7 months. In the Walnut Beach School, there is a range of 5 years with a median mental age of 6 years. Test results, teachers' estimates, and nurse's estimates were used in sectioning the pupils into ability groups.

During the second semester, additional information was collected on personality traits, work habits, emotional stability, health, home conditions, and school success from teacher, nurse, principal, and supervisor. On the basis of this history, analyses were made, and recommendations followed. The specific attempt was made to place together those children who were most similar in mentality, achievement, and personality. Pupils to be advanced one semester or two semesters were required to have mental ages equivalent to the average pupil of the grade to which they were being promoted.

In the Central Grammar School, four pupils with a mental age of eight years were advanced two semesters; in the Devon School one pupil with a mental age of eight years was advanced two semesters. Fifteen pupils from the Central Grammar School with mental ages ranging from 7 years to 7 years 11 months were advanced to the second B grade,

or one semester; 7 children from the Devon School with a mental age of 7 years were advanced one semester. In the Walnut Beach School one child with a mental age of 8 was advanced one semester. In promoting these pupils there was little chance of failure on their part since all factors showed superiority in mental capacity, past school success, work habits, personality traits, emotional life, and physical health.

The pupils whose test results were at variance with the teachers' judgments and the supervisor's views, were given an individual scale. The Terman Revision of the Binet-Simon Scale was used. Because of the greater reliability of the individual test results, refined classifications were then made depending upon these. Ten children of the Central Grammar School were given this test: one, whose former testing showed a mental age below six years, but who, according to the individual test, had a mental age of 6 and an intelligence quotient of 85, was retained in Grade I; the other nine children had mental ages ranging from four to five years. These pupils were not demoted but were given work upon a kindergarten level.

From the data given, it is evident that a child in this school system with a mental age below six cannot do successful work in the first grade. Since many children enter these schools with low mental ages, the number of

non-promotions must be correspondingly large. Retardation may soon become a serious problem in the primary grades of this system.

During the latter part of September, 1930, the Department of Research of Richmond, Virginia, under the direction of Clyde Busby (4), gave the Pintner-Cunningham Primary Mental Test to 391 pupils of IB grade of three schools.

The reasons given for the administering of the test were: (1) that the principals might obtain some indication of the abilities of the pupils; (2) to aid in grouping the pupils in fairly homogeneous groups; (3) that the results might be a guide in adjusting the work of the grade to the abilities of the pupils.

In February, 1931, the Gates Primary Reading Test was given to 280 of the above pupils in order that some objective measure of the achievement of the IB pupils in reading might be obtained.

In order that data would be as complete as possible only those pupils were included in the study for whom the following items of information were available: chronological age, mental age, reading grade on Gates Test, teachers' estimate of work, days present, and terms in grade. All of these items were available for 259 pupils.

Of the 259 pupils, at the beginning of the school year, the average age was seventy-nine months, or 6 years 7 months. Therefore, as far as chronological age is an indication, the average pupil from this group was old enough to begin IB reading.

The mental ages were determined from the Pintner-Cunningham Primary Mental Test. The distribution of chronological and mental ages, shown in Table XI, gives a range of 5 years in chronological age and almost the same range in mental age. The highest mental ages fall between the chronological ages of 6 and 7½.

A distribution of the mental ages and the Reading grade obtained from the Gates Primary Reading Test is given in Table XII. This table shows a high correlation between the mental ages and the reading grade. When determined, the coefficient of correlation was found to be .643. A high relation was also found between the reading grades and the teachers' estimates.

The median mental age of pupils receiving "U" (failure) was 5 years 2 months; those receiving "F" (passing) 6 years 6 months; the median mental age of pupils receiving "E" was 6 years 9 months. 62 per cent of the pupils who were mentally younger than 6 years at the beginning of the term were promoted. The reason was that

TABLE XI

Chronological and Mental Ages of 259 IB Pupils
1930 - 1931

Chronological Ages	Mental Ages										
	4-0 4-5	4-6 4-11	5-0 5-5	5-6 5-11	6-0 6-5	6-6 6-11	7-0 7-5	7-6 7-11	8-0 8-5	8-6 8-11	Total
10-6				1							1
10-5											
10-0											
9-11											
9-6				1							1
9-5											
9-0		1				1					2
8-11											
8-6	1			1		2					4
8-5											
8-0		1	1	3	1	2	2				10
7-11											
7-6			1	3	1	3		1			9
7-5											
7-0	2	3	2	5	3	2	3	2			22
6-11											
6-6	2	6	10	9	5	8	4	9	1	1	55
6-5											
6-0	6	7	21	21	32	18	18	7		1	131
5-11											
5-6	1		5	3	6	4	4	1			24
Total	12	18	40	47	48	40	31	20	1	2	259

TABLE XII

Mental Ages and Reading Grade on Gates Primary Reading Test 1930 - 1931

	Gates Primary Reading Test																
M.A.	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	Total
9.0 9.4 8.5	4	4	11	10	4	8	2	-	-	-	-	-	-	-	-	1	44
8.9 8.0	9	14	18	29	16	5	-	1	1	3	-	-	-	1	-	-	97
8.4 7.5	6	13	11	14	11	4	5	-	-	1	1	-	-	-	-	-	66
7.9 7.0	1	1	6	5	3	3	1	-	2	1	-	-	-	-	-	-	23
7.4 6.5	1	2	5	2	1	-	1	-	-	-	-	-	1	-	-	-	13
6.9 6.0	2	1	1	1	-	1	1	-	-	-	-	1	-	-	-	-	8
6.4 5.5	-	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-	5
5.9 5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
5.4 4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
4.9 4.0	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4.4 3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
3.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Total	25	36	53	65	35	21	10	1	3	5	1	1	1	1		1	259
Median	8.5	8.5	8.6	8.6	8.6	8.8	8.2	8.7	7.9	8.6	8.2	6.7	7.2	8.7		9.1	8.5

one of the schools marked the pupils "F" if they had shown progress, even if they had not completed IB. 93 per cent of the pupils who were mentally 6 years old at the beginning of the term were promoted; of those who were 6 years 6 months, 95 per cent were promoted.

The median number of days attendance for the 259 pupils was 86. For the pupils receiving "E" the median number of days was 88; for those receiving "G" and "F", 86; for the "U" pupils, 83. From these figures it is evident that attendance had relatively little effect on teachers' estimates of pupils' achievement. They also indicate that achievement on a standardized test is not materially affected by attendance. The pupil who did nothing on the Gates Test attended school 85 days, those who did two, three, or four months work on the test attended 86 days, while the median pupil who reached the Gates norm attended 88 days.

In September, 1928, 141 first-grade children of the Winnetka schools were given the Detroit First-Grade Intelligence Test. The teachers were not told the mental ages of the children. Later in the year, the Stanford Revision of the Binet-Simon Scale was given, and the mental ages were computed as of September. The children were required to know at least 139 words at sight before

passing from first-grade reading to second-grade reading. Table XIII gives the number of children of each mental age who made satisfactory progress in reading. No percentages were figured for groups of less than ten children. This table shows that a small percentage of children who began reading with a mental age of less than six years were able to achieve satisfactory reading progress, but that for the group having a mental age between 6 years and 6 years 6 months there was a notable rise in the percentage making satisfactory progress.

The following year, 1929-30, a similar study was carried on for the purpose of checking the results of the 1928-29 experiment. Mental ages were determined by the Detroit First-Grade Intelligence Test and the Pintner-Cunningham Primary Mental Test, and reading ability by the Gray Standardized Oral Reading Check Test. All children who were mentally 6 years of age or more were taught reading from the beginning of the year. The previous study made it seem futile to try to teach younger children, but for the purpose of the experiment, a few children with lower mental ages were also taught reading. Table XIV shows that the results confirmed those of the previous year. The percentage of children who learned to read satisfactorily is greatest at the mental age of 6 years 6 months and of

TABLE XIII

Number of Children of Each Mental Age and Percentage Making Satisfactory Reading Progress

M.A.	Number of Children		Percentage Making Satisfactory Reading Progress	
	Detroit Test	Stanford-Binet Test	Detroit Test	Stanford-Binet Test
4.5 - 4.11	1	1	--	--
5.0 - 5.5	12	1	0	--
5.6 - 5.11	12	12	0	8
6.0 - 6.5	17	22	47	41
6.6 - 6.11	23	38	78	68
7.0 - 7.5	29	31	79	68
7.6 - 7.11	16	15	75	87
8.0 - 8.5	7	11	--	82
8.6 - 9.0	8	2	--	--

TABLE XIV

Number of Children of Each Mental Age and Percentage Making Satisfactory Reading Progress

M.A.	Number of Children		Percentage Making Satisfactory Reading Progress	
	Detroit Test	Pintner-Cunningham Test	Detroit Test	Pintner-Cunningham Test
5.0 - 5.5	1	0	-----	-----
5.6 - 5.11	10	9	-----	-----
6.0 - 6.5	25	24	64	58
6.6 - 6.11	23	23	87	83
7.0 - 7.5	23	23	87	91
7.6 - 7.11	12	12	83	92
8.0 - 8.5	5	5	-----	-----
8.6 - 8.11	1	1	-----	-----

7 years. The second year's experiment, therefore, in which different teachers, different children, different tests, and a different method were used, confirms the first experiment in all its basic conclusions.

From this study the authors conclude that it would be advantageous to postpone the teaching of reading until children reach a mental level of six and a half years. Since reading is the principal subject of the first grade, it seems safe to say that if entrance to first grade were deferred until children had attained this optimum mental age, teachers could greatly decrease the chances of failure and discouragement and correspondingly increase their efficiency.

Summary: From the studies of the present chapter we may conclude that if a child enters the first grade with a mental age below five years six months, there is little possibility of his succeeding in the work; if he has a mental age of approximately six years, his chances of success are good; but the optimum mental age for first-grade work seems to be, from the studies cited, between the ages of six years and six years six months.

CHAPTER IV

A STUDY OF ENTRANCE AGE AND GRADE PROGRESS IN ST. BRIDE'S SCHOOL, CHICAGO 1929 - 1933

A special study of the age, chronological and mental, of a child's entrance to the first grade, in its relation to subsequent progress in the primary grades, was made at St. Bride's School, Chicago. The investigation included a period of four years. The pupils who entered school in September, 1929, were the first subjects of study. Their progress was followed through Grade IV; those who entered in September, 1930, were followed through Grade III; the September, 1931 entrants, through Grade II; and those who entered in 1932, were studied for one year. Thus, the records of four promotions were available for the first group, of three promotions for the second group, two for the third, and one for the fourth group.

Chronological ages in years and total number of months for the sixty-one pupils enrolled in the first grade in 1929 were obtained from the teachers. The Pressey Primary Classification Test was used as a scale to define the mental ages of the members of the class. These data are presented in Table XV.

TABLE XV

Chronological Ages, Mental Ages, and Intelligence Quotients of 61 September, 1929, Entrants

Pupils	M.A.	C.A.	I.Q.
1	8.0	6.6	123
2	8.9	6.11	130
3	8.5	6.10	125
4	7.0	7.0	100
5	6.5	6.11	92
6	8.4	6.11	128
7	9.5	7.0	134
8	8.5	7.0	120
9	8.5	7.8	110
10	5.10	5.9	101
11	9.2	8.5	123
12	5.7	6.8	84
13	8.0	6.10	119
14	8.5	8.1	114
15	8.5	6.8	126
16	6.5	6.11	92
17	7.5	7.11	93
18	7.5	6.10	106
19	10.0	8.0	125
20	6.5	6.7	98
21	7.5	6.7	112
22	8.0	7.2	111
23	9.2	6.9	124
24	9.5	7.0	134
25	7.5	6.6	114
26	7.9	6.5	120
27	8.5	7.4	114
28	8.0	7.3	110
29	8.5	6.6	129
30	6.5	7.2	89
31	9.5	6.10	127
32	7.0	6.9	103
33	8.5	7.1	118
34	9.5	6.7	133
35	7.0	6.9	103
36	8.4	6.6	128
37	5.10	6.8	87
38	8.5	6.9	124
39	8.6	8.6	100
40	8.5	7.1	118

TABLE XV - Continued

Pupils	M.A.	C.A.	I.Q.
41	6.9	6.7	102
42	8.5	6.10	118
43	9.5	6.11	136
44	8.5	7.2	128
45	8.2	7.2	113
46	9.5	7.7	125
47	8.0	6.9	114
48	7.5	8.4	89
49	8.5	7.3	118
50	9.0	6.8	135
51	6.5	6.8	96
52	8.5	6.9	124
53	10.5	8.3	143
54	9.0	7.3	124
55	9.5	7.1	132
56	8.5	9.2	91
57	6.5	7.0	91
58	8.5	9.1	92
59	7.5	6.9	108
60	7.5	6.8	110
61	9.0	7.3	124
Median	8.5	6.10	114

TABLE XVI

Distribution of Chronological and Mental Ages of 61 September, 1929, Entrants

	5-6 5-11 (1)	6-0 6-5 (2)	6-6 6-11 (3)	7-0 7-5 (4)	7-6 7-11 (5)	8-0 8-5 (6)	8-6 8-11 (7)	9-0 9-5 (8)
C.A.	1	1	31	17	3	5	1	2
M.A.	3	6	1	10	1	24	3	13

A Study of Table XV shows that the range in chronological age is from five years nine months to nine years two months. The ages, as a whole, are high for Grade IB. The median chronological age is six years ten months. The range in mental age is from five years eight months to ten years five months. The median mental age is eight years five months. From the results obtained from the mental test, it would seem that a considerable proportion of the pupils could be advanced one, two, three, or four years after a more or less brief school experience. The wide range of ability depicted, evidences a need of reclassification.

From the standpoint of the problem to be attacked by the writer - that of the relationship between age of entrance and school success or failure - this group was disappointing. Only one pupil - No.10 - had a C.A. of less than six years. Only three pupils - Nos.10, 12, and 37 - had an M.A. of less than six years. Only nineteen pupils - Nos.4, 5, 12, 16, 17, 18, 20, 30, 32, 35, 37, 39, 41, 48, 51, 56, 57, 58, and 59 - had an I.Q. of less than 110. The group, compared with the typical first-grade group, was remarkably mature, both physically and mentally. There was little if any prospect of obtaining much data bearing on the critical age for entrance to first grade; that is, bearing on the minimum C.A. or M.A. necessary for successful work. It was, however, possible to study what may be called the upper

critical age; that is, the M.A. above which it would be safe to advance the child one or more grades.

In determining the advancement of pupils in the primary grades, the importance of Reading ability must be particularly emphasized. In order to obtain an objective measure of this ability, the Williams Primary Reading Test was given in May to fifty-seven of the sixty-one children who entered in 1929. The highest possible score obtainable is 49. The median score of the class was 21. The author of the test has transmuted the scores into corresponding mental ages and the median M.A. of the class was found to be seven years eleven months.

It may appear surprising that the median M.A. of the group was only 7-11 in May, when it is remembered that it was 8-5 in September. With a group whose median I.Q. was well above 100, there should have been an increase in M.A. of at least nine months, which would have given a median M.A. of 9-2 instead of one of 7-11. Nothing can be said of this unexpected variation except that it indicates the need of extreme care in using and interpreting tests. Intelligence tests standardized for much older children are known to differ greatly in the results which they yield, an I.Q. of 100 on one sometimes being the equal of an I.Q. twenty or more points higher or lower on another. It is

also well known that written group tests for primary children are still more unreliable. In the present case, then, perfect agreement between the two tests would have been more surprising than the disagreement which was found to exist.

From data gathered from mental and achievement tests, teachers' ratings, and health records, seventeen pupils with M.A.'s ranging from 8-9 to 11-2 were advanced to the second grade in May, 1930; in September, 1930, sixteen of these pupils passed to the third grade. Two children, Nos.12 and 37 of Table XV, with C.A.'s in May of seven years four months and M.A.'s of five years ten months and six years, were retained in Grade I; forty-two children whose M.A.'s ranged from 6-6 to 9 were promoted to Grade II.

In May, 1931, the Detroit Reading Test was given to the forty-three children of the 1929 class in Grade II. The norm for the month of May is 13. The class median was 17. Seven children obtained the highest possible score on the test - 24. Two of these children were chronologically among the youngest in the class. Table XVII gives the data obtained from this test.

In September, 1931, seven pupils transferred, leaving thirty-six of the 1929 entrants in Grade III. During the months of February, March, April and May of 1932, a series

TABLE XVII

Scores of 43 Pupils on Detroit Reading Test Given in May, 1931

Pupils	Highest Possible Score	Norm	Class Median
1	2	3	4
43	24	13	17

TABLE XVIII

Scores of 36 Third-Grade Pupils, Promoted Regularly, on the Columbian Achievement Tests 1932

	Spelling	Reading	Nature Study	English Dictation	Arithmetic Computation	Vocabulary
	February - March					
Norm	16	23	14	16	41	20
Class Median	21	24	13	18	44	25
	April - May					
Norm	19	26	16	17.5	44	23
Class Median	23	28	14	19	46	27

of Columbian tests were administered to the thirty-six pupils. In each two-month unit of these tests, a complete survey is made of all the subjects, thus the second survey serves as a check-up on the first. Table XVIII gives the results obtained from these two surveys.

In November, 1932, the Otis Group Primary Intelligence Scale was given to the thirty-six children who were now in fourth grade. The median M.A. obtained from the eight tests comprised in this scale was 10-9, and the median I.Q. was 110. Achievement tests issued by the Catholic School Board and based upon the course of study in current use, were given in the last week of January, 1933. Similar tests were again given in June, 1933, but based upon the work of the second semester. The comparison of the city norms with the median score of the 1929 entrants in fourth grade in each of the subjects is shown in Table XIX. In the January tests, the class median was below the norm in spelling and equal in arithmetic computation; in all other subjects it was above the norm. In the June tests the class median exceeded the norm in all subjects.

The two children who in September, 1929, had M.A.'s below six and who remained in first grade for two years, were promoted to second grade in September, 1931, and to

TABLE XIX

Scores of 36 Fourth-Grade Pupils. January and June, 1933
Chicago Archdiocesan Achievement Tests

	Spelling	Religion	History	Arith. Reas.	Arith. Comp.	Geo.	Eng.	Literature	Reading
	January, 1933								
Norm	46	61	53	31	45	80	87	33	34
Class Median	45	74	67	40	45	81	91	39	41
	June, 1933								
Norm	23	36	41	20	26	42	69	30	40
Class Median	28	41	45	26	28	46	73	38	46

third grade in September, 1932, doing in each grade the work of average pupils. Of the sixteen pupils promoted to third grade in September, 1930, all passed to fourth grade in September, 1931. In May, 1932, three of these pupils who had done superior work on tests and according to teachers' ratings, were given an opportunity of doing special work under supervision and a trial promotion to sixth grade in September, 1932. One pupil promoted from first grade to second in May, 1930 was retained in second grade in September, but during the years 1931 and 1932 passed one grade a year. As judged by test scores and teachers' estimates, the work of the thirty-three pupils who passed regularly from September 1929 to June, 1933, was satisfactory.

It may be stated that, if health and social adjustment are satisfactory, a child with a mental age of 8-9 or above may, after a year in school, be advanced to third grade. This, of course, is true only of schools with standards and methods similar to those found in the school where this study was made.

Study of the September, 1930, Entrants

In September, 1930, the first-grade enrollment was 77. The mental ages of these pupils were determined by the Pressey Primary Classification Test. Table XX presents the C.A., M.A., and I.Q. for each child. The range in C.A. is from 5-7 to 8-7; the median C.A. is 6-8. The range in M.A. is from 5-5 to 9-5; the median M.A. is 7-0. The I.Q. range is from 70 to 136, with a median of 103. Five pupils have a C.A. of less than six years, with M.A.'s ranging from 5-9 to 7-0 years, and I.Q.'s from 98 to 118. Only three pupils have M.A.'s of less than six years; their I.Q.'s are 70, 98, 102. The highest mental ages are between the chronological ages of 6-11 and 8-0.

The criteria of progress was based upon a series of tests given for three successive years, and supplemented by the ratings and judgments of teachers. Ten pupils - Nos. 11,27,31,34,38,42,48,51,52, and 56 - of Table XX, with M.A.'s in September ranging from 8-0 to 9-5 and who had been rated high by teachers, were in February, 1931, advanced to the second grade. In September, 1931, these ten pupils entered the third grade. At the close of the second semester, June, 1931, four pupils - Nos.17,37,44, and 74 - of Table XX, with M.A.'s in September of 5-5, 6-2, 6-1, and 5-9 respectively, were rated low by their teachers

TABLE XX

Chronological Ages, Mental Ages, and Intelligence Quotients of 77 September, 1930, Entrants

Pupils	C.A.	M.A.	I.Q.
1	6.8	6.9	101
2	7.4	6.5	87
3	8.7	7.0	81
4	7.0	6.10	97
5	6.7	6.8	101
6	7.2	8.0	111
7	6.7	7.6	113
8	6.9	7.2	106
9	7.4	7.7	103
10	8.0	6.4	79
11	7.2	8.4	116
12	7.0	7.6	107
13	6.8	7.4	110
14	6.4	6.9	106
15	7.3	7.0	93
16	6.7	6.11	103
17	7.8	5.5	70
18	6.6	6.10	105
19	7.1	7.3	102
20	6.7	7.8	116
21	6.10	7.1	103
22	6.8	7.5	111
23	6.7	6.10	104
24	6.6	7.2	111
25	5.11	7.0	117
26	6.9	7.3	106
27	6.7	8.6	129
28	7.1	7.7	107
29	6.9	6.11	102
30	6.10	7.0	102
31	7.7	9.4	123
32	6.9	7.3	107
33	6.7	6.8	101
34	7.0	8.2	116
35	6.8	7.9	116
36	6.7	7.5	112
37	6.10	6.2	90
38	8.0	9.3	115
39	6.11	7.0	101
40	7.1	7.3	102
41	6.8	7.3	108

TABLE XX - Continued

Pupils	C.A.	M.A.	I.Q.
42	7.3	9.2	136
43	6.5	6.7	102
44	6.8	6.1	92
45	7.0	7.0	100
46	7.0	7.5	105
47	6.6	6.8	102
48	6.10	8.5	123
49	6.11	7.1	102
50	6.6	8.0	123
51	6.11	9.5	136
52	7.2	8.5	117
53	7.2	7.6	104
54	7.9	7.7	97
55	6.4	6.10	105
56	8.4	8.0	96
57	7.3	7.5	102
58	6.8	6.10	102
59	8.3	7.2	86
60	6.8	6.11	103
61	7.3	7.6	102
62	6.5	6.8	103
63	6.8	6.10	102
64	6.2	6.5	103
65	6.0	6.8	111
66	6.6	6.10	105
67	5.11	7.0	118
68	6.0	7.0	116
69	7.0	7.2	102
70	6.0	6.5	106
71	5.8	5.11	102
72	6.6	6.7	101
73	6.3	6.5	102
74	5.9	5.9	98
75	6.5	6.8	103
76	6.2	6.5	103
77	5.7	6.0	104
Median	6.8	7.0	103

and retained in first grade. Sixty-three pupils were promoted to second grade. In September, 1931, the 1930 entrants were in three grades: 4 in first grade, 59 in second, and 10 in third grade.

In November, 1931, the Otis Primary Intelligence Test was given. No changes in grade placement were made, no double promotions, nor were any pupils retarded. In the following October, the Haggerty Test, Sigma I was given to fifty-four of the 1930 entrants. The median obtained was 2.8; the norm is 2.4. This class exemplifies a typical average group. If illness or other cause does not demand much absence, the group as a whole will probably progress at a normal rate. In June, 1933, two pupils of this class failed to be promoted, but their failure was due to protracted illness, not to lack of ability.

Summary: Of the 77 pupils who entered first grade in September, 1930, ten pupils with mental ages from 8-0 to 9-5 were, after five months, advanced to the second grade; and at the close of the second semester promoted to third grade. In the third grade, as also in the fourth grade, several of these pupils ranked among the highest of the class. Four pupils with M.A.'s of 5-5, 5-9, 6-1, and 6-2 repeated the first grade, and progressed

with average ability in second grade, 1932. Of the fifty-four pupils promoted to third grade, all, with but two exceptions, progressed satisfactorily. Two of these pupils failed, not through lack of ability but because of long absence.

Study of the 1931 Entrants

The chronological and mental ages of the fifty-two children of the 1931 first grade are given in Table XXII. The range in C.A. is from 5-11 to 8-3, with a median C.A. of 6-5. The mental ages were derived from the Pintner-Cunningham Primary Mental Test, which was given November 13. The range in mental ages is from 5-8 to 9-5, with a median M.A. of 6-8. The median I.Q. is 104. Only one child had a C.A. of less than 6 years. Four children had an M.A. of less than 6 years. On March 16, 1932, the same test was again administered to the same pupils. Table XXIV shows the distribution of scores of the two testings, with corresponding mental ages. In many cases a slight increase in the score is evident.

In April the Otis Group Primary Intelligence Scale was given. A study of the data of three mental tests and of teachers' ratings of class work, health, and attitude resulted in the special promotion of two children to the third grade.

TABLE XXII

Chronological and Mental Ages
of 52 September, 1931, Entrants

Pupils	C.A.	M.A.
1	6.3	6.4
2	6.2	6.5
3	6.5	6.10
4	6.8	8.6
5	6.0	6.5
6	7.3	8.8
7	6.5	6.10
8	7.6	9.1
9	8.3	9.4
10	5.11	5.10
11	6.3	6.0
12	6.3	6.4
13	6.8	7.0
14	7.0	8.7
15	6.2	6.4
16	6.4	6.8
17	6.3	6.3
18	6.5	6.7
19	7.1	8.6
20	6.3	6.4
21	6.2	6.5
22	6.1	5.10
23	6.6	8.2
24	6.5	6.7
25	6.0	6.3
26	6.2	8.3
27	6.7	7.2
28	6.5	6.5
29	6.2	7.6
30	6.6	7.1
31	6.5	6.5
32	6.3	8.6
33	6.10	6.3
34	6.2	5.8
35	6.0	6.11
36	6.6	7.6
37	6.5	6.6
38	6.0	6.8
39	6.2	6.8
40	6.6	7.5
41	6.8	8.8

TABLE XXII - Continued

Pupils	C.A.	M.A.
42	6.10	7.8
43	6.6	6.7
44	6.3	5.9
45	6.7	7.6
46	6.6	6.8
47	6.6	7.10
48	6.7	8.6
49	6.3	7.11
50	6.8	7.5
51	6.7	7.9
52	6.6	6.8
Median	6.5	6.8

TABLE XXI

Distribution of Chronological and Mental Ages of 77 September, 1930, Entrants

	5-5	5-6 5-11	6-0 6-5	6-6 6-11	7-0 7-5	7-6 7-11	8-0 8-5	8-6 8-11	9-0 9-5
C.A.		5	12	34	18	3	4	1	
M.A.	1	2	9	20	24	9	7	1	4

TABLE XXIII

Distribution of Chronological and Mental Ages of 52 September, 1931, Entrants

	5-6 5-11	6-0 6-5	6-6 6-11	7-0 7-5	7-6 7-11	8-0 8-5	8-6 8-11	9-0 9-5
C.A.	1	28	18	3	1	1		
M.A.	4	14	10	5	8	2	7	2

In September of the following year the Otis Group Intelligence Scale was again given to these same children in second grade. A decided increase in scores was observable in many cases; in others, the score was the same or the increase so small as to be practically negligible, but in no instance did a child lower his previous record. A comparison of the results obtained from the two administrations of the Otis test are given in Table XXV.

As a means of gauging the achievement in reading, the Detroit Reading Test was given June 6, 1933. The norm for the last month of 2A is 12.5; the class median was 17. The scores obtained from this test are given in Table XXVI. Only seven pupils scored lower than the norm. An analysis of the data - that is, of mental and achievement tests, teachers' estimates, and past records - resulted in the promotion of six children to the fourth grade. An investigation of the work of these children in the fourth grade showed that after special help had been given for several weeks these six pupils did satisfactory work, that two of the six were doing exceptionally good work.

Summary: During two years, 1931-1933, fifty-two children were given a battery of tests. Eight double promotions were made; two children were promoted from first

TABLE XXIV

Scores on the Pintner-Cunningham Primary Mental Test Given November, 1931, and March, 1932, with Corresponding Mental Ages

M.A.	Score 1931	Frequency	Score 1932	Frequency
5.8 - 6.1	20-24	8	20-24	2
6.2 - 6.7	25-29	19	25-29	7
6.9 - 7.2	30-34	5	30-34	10
7.3 - 7.9	35-39	9	35-39	13
7.10- 8.3	40-44	4	40-44	7
8.5 - 8.10	45-49	6	45-49	11
8.11- 9.4	50-54		50-54	2
9.5	55-59	1	55-59	
Total		52		52

TABLE XXV

Scores on the Otis Group Primary Intelligence Test Given to 52 First-Grade Pupils in April, 1932, and to 50 Second-Grade Pupils, September, 1932

Score April 1932	Frequency	Score Sept. 1932	Frequency
15-19	2	15-19	
20-24	8	20-24	4
25-29	6	25-29	10
30-34	7	30-34	3
35-39	12	35-39	7
40-44	6	40-44	14
45-49	5	45-49	4
50-54	1	50-54	2
55-59	2	55-59	1
60-64	2	60-64	4
65-69	1	65-69	1
Total	52	Total	50

TABLE XXVI

Scores of 50 Second-Grade Pupils on Detroit Reading Test Given June 6, 1933

24-22	21-19	18-16	15-13	12-10	9-7	6-4
21	2	5	7	8	2	5

grade to third and six from second to fourth. Their satisfactory progress justifies the conclusion that, providing other deterrent factors do not exist, a child may safely be advanced to the grade which has a median M.A. equal to his own M.A. The normal advancement of forty-four pupils leads one to conclude that an M.A. of at least 5-8 is necessary for success in first grade.

Study of the 1932 Entrants

The last group of our study entered first grade in 1932. The mental ages of these fifty-nine children were determined by the Pintner-Cunningham Primary Mental Test given in September, 1932. Table XXVII gives the chronological and mental ages. The range of C.A. is from 5-8 to 8-11. The median C.A. is 6-3. The range in M.A. is from from 5-5 to 9-5. The median M.A. is 6-7. The progress of this group was judged from the teachers' ratings and from tests. Toward the end of the first semester, in January, 1933, the Detroit Word Recognition Test was given. The scores obtained from this test and from the Pintner-Cunningham Primary Mental Test are shown in Table XXIX. Five children with M.A.'s in September ranging from 8-2 to 9-5 were promoted in February to second grade, where they progressed satisfactorily, being ready for

TABLE XXVII

Chronological and Mental Ages of 59 September, 1932, Entrants

Pupils	C.A.	M.A.
1	5.8	5.11
2	5.9	6.3
3	6.3	6.5
4	6.2	6.8
5	6.2	6.3
6	6.0	6.0
7	7.2	7.5
8	6.1	6.6
9	6.3	7.4
10	5.10	5.11
11	6.2	6.4
12	6.4	8.2
13	6.1	6.2
14	6.5	7.0
15	8.0	8.9
16	7.6	7.9
17	6.1	6.3
18	6.2	6.7
19	6.7	6.8
20	6.8	6.10
21	6.3	6.6
22	5.10	5.5
23	6.6	7.5
24	6.0	6.6
25	6.3	7.3
26	8.11	8.0
27	6.0	6.7
28	6.5	7.7
29	6.2	6.6
30	5.11	6.0
31	6.1	6.3
32	6.3	6.5
33	6.5	7.2
34	8.2	8.5
35	6.6	7.3
36	6.2	6.4
37	6.2	6.8
38	7.1	7.2
39	6.0	6.2

TABLE XXVII - Continued

Pupils	C.A.	M.A.
40	8.1	8.3
41	6.7	6.7
42	6.3	6.5
43	6.6	6.7
44	6.7	6.11
45	7.3	7.7
46	6.4	6.6
47	6.5	7.6
48	7.5	7.10
49	6.1	6.3
50	6.5	6.10
51	6.8	9.5
52	6.4	6.5
53	7.8	7.10
54	6.0	6.4
55	6.5	6.6
56	6.2	6.4
57	6.1	5.9
58	6.3	7.0
59	6.4	6.5
Median	6.3	6.7

TABLE XXVIII

Distribution of Chronological and Mental Ages of 59 September, 1932, Entrants

	5-5	5-6 5-11	6-0 6-5	6-6 6-11	7-0 7-5	7-6 7-11	8-0 8-5	8-6 8-11	9-0 9-5
C.A.		5	36	8	4	2	3	1	
M.A.	1	3	18	16	9	6	2	3	1

TABLE XXIX

Scores of 58 First-Grade Pupils on Pintner-Cunningham Mental Test and Detroit Word Recognition Test

Score	Frequency	Score	Frequency
September, 1932		January, 1933	
50 - 54	7	35 -36	3
45 - 49	9	30 -34	5
40 - 44	19	25 -29	12
35 - 39	8	20 -24	5
30 - 34	4	15 -19	9
25 - 29	5	10 -14	14
20 - 24	3	5 -9	8
15 - 19	3	0 -4	2
10 - 14			
Total	58	Total	58
Highest Score Possible	56		
Norm	30		
Class Median	41		

third grade in June. It was noted that in the tests given, the children who scored high on the mental test scored high on the achievement test, and likewise, those who scored low on one, scored low on the other. In the majority of cases the teachers' estimates were in accord with the test results.

The data of this study clearly indicate a positive correlation between M.A. and progress. Although C.A. is the most commonly used entrance specification, there is so much variability that it is difficult to state any C.A. for entrance that is not modified in practice by some other factor. The present study, far from defining a C.A. as certain to indicate readiness to do first grade,work, makes evident the varying abilities of children at any given C.A. An M.A. of six years at entrance to first grade seems to carry, in the light of the present study, a certain amount of assurance of success.

Summary: The progress of 249 pupils in the primary grades was studied during a period of four years. Only the children who entered at the beginning of the school year were considered, and those who registered in the course of the year were not included in the study. The criteria for achievement and reclassification throughout

the study were test results, mental and educational, and teachers' ratings. During the four years, forty children with M.A.'s of 7-5 and above were given double promotions, and all, with one exception, did satisfactory work in the grade to which they were promoted. Nine pupils, with M.A.'s at entrance ranging from 5-5 to 6-2, were retarded: six pupils in first grade, one in second, and two in third grade. The failure of the pupils in second and third grades was due to illness and long absences. In this study, pupils with an M.A. of about six or more are the only ones who succeed in first grade. Almost all pupils who repeat a grade have low M.A.'s.

CHAPTER V

GENERAL SUMMARY AND CONCLUSIONS

Chronological age, the factor generally used for admission to the first grade is, in the studies cited, too variable, too dependent upon other factors, to enable one to determine a definite level requisite for satisfactory progress. This variability of chronological age and progress of children in the primary grades is not peculiar to any one city, state, or country. Failing pupils not infrequently are older chronologically than promoted pupils, indicating little relationship between chronological age and achievement.

The high percentage of promotion among children who are six years old or more, mentally, and the high correlation between mental age and achievement tests, notably that of Gates Primary Reading Test, indicate a close relationship. Discrepancies in the correlation of work accomplished and mental age may usually be explained and ordinarily do not occur in the case of more than 15% of the children tested. Among bright pupils, mental maturity is not the sole criterion of success; a child with a low mental age, but industrious and persevering, may succeed as well as one with a high mental age who does

not possess good work habits and attitudes.

Conclusions:

1. Chronological age is less indicative of probable success than mental age. Only when children of about the same intelligence quotient are selected, can one expect a positive correlation between chronological age and achievement.

2. A mental age at entrance of approximately six years is necessary for successful first-grade work.

3. Failure in first grade is due largely to low mental age.

4. A child in any school can be promoted to a class whose median mental age is no higher than his own.

5. Exceptional industry can rarely compensate a child's disadvantage if placed in first grade when his mental age is less than the grade standard by one or two years.

6. The mental age is the most reliable single index of a child's readiness to do first-grade work.

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The thesis "The Relation Between Entrance Age and Subsequent Progress in the Primary Grades," written by Mother M. Imelda Wall, I.B.V.M., has been accepted by the Graduate School of Loyola University, with reference to form, and by the readers whose names appear below, with reference to content. It is, therefore, accepted as a partial fulfilment of the requirements of the degree conferred.

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